



US00RE40281E

(19) **United States**
(12) **Reissued Patent**
Tzannes et al.

(10) **Patent Number:** **US RE40,281 E**
(45) **Date of Reissued Patent:** **Apr. 29, 2008**

(54) **SIGNAL PROCESSING UTILIZING A TREE-STRUCTURED ARRAY**

(75) Inventors: **Michael A. Tzannes**, Lexington, MA (US); **Peter N. Heller**, Somerville, MA (US); **John P. Stautner**, The Woodlands, TX (US); **William R. Morrell**, Seattle, WA (US); **Sriram Jayasimha**, Hyderabad (IN)

(73) Assignee: **Aware, Inc.**, Bedford, MA (US)

(21) Appl. No.: **10/994,925**

(22) Filed: **Nov. 23, 2004**
(Under 37 CFR 1.47)

Related U.S. Patent Documents

Reissue of:

(64) Patent No.: **6,252,909**
Issued: **Jun. 26, 2001**
Appl. No.: **08/804,909**
Filed: **Feb. 25, 1997**

U.S. Applications:

(62) Division of application No. 10/603,833, filed on Jun. 26, 2003, which is a continuation-in-part of application No. 08/307,331, filed on Sep. 16, 1994, now Pat. No. 5,606,642, which is a division of application No. 07/948,147, filed on Sep. 21, 1992, now Pat. No. 5,408,580.

(51) **Int. Cl.**

G10L 19/02 (2006.01)
H04K 1/10 (2006.01)
H04B 1/38 (2006.01)
H03D 1/24 (2006.01)

(52) **U.S. Cl.** **704/205; 375/260; 375/219; 329/357**

(58) **Field of Classification Search** None
See application file for complete search history.

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Primary Examiner—David D. Knepper
(74) *Attorney, Agent, or Firm*—Sheridan Ross P.C.; Jason H. Vick

(57) **ABSTRACT**

[A communication system for sending a sequence of symbols on a communication link. The system includes a transmitter for placing information indicative of the sequence of symbols on the communication link and a receiver for receiving the information placed on the communication link by the transmitter. The transmitter includes a clock for defining successive frames, each of the frames including M time intervals, where M is an integer greater than 1. A modulator modulates each of M carrier signals with a signal related to the value of one of the symbols thereby generating a modulated carrier signal corresponding to each of the carrier signals. The modulated carriers are combined into a sum signal which is transmitted on the communication link. The carrier signals include first and second carriers, the first carrier having a different bandwidth than the second carrier. In one embodiment, the modulator includes a tree-structured array of filter banks having M leaf nodes, each of the values related to the symbols forming an input to a corresponding one of the leaf nodes. Each of the nodes includes one of the filter banks. Similarly, the receiver can be constructed of a tree-structured array of sub-band filter banks for converting M time-domain samples received on the communication link to M symbol values.] *Signal processing is performed by splitting a signal into subbands using a plurality of filter banks connected to form a tree-structured array. The filter banks are connected so that the signal is split into subbands of different size. The subbands can be designed to approximate the bands of the human auditory system for audio signal processing applications. Reconstruction of signals using a plurality of synthesis filter banks connected to form a tree-structured array is also performed.*

121 Claims, 16 Drawing Sheets

